



Environmental Health  
& Engineering, Inc.  
117 Fourth Avenue  
Needham, MA  
02494-2725

Tel 800-825-5343  
781-247-4300  
FAX 781-247-4305

To: Pat Goddard, Director of Facilities, Town of Lexington  
Paul Ash, Superintendent, Lexington Public Schools  
From: David MacIntosh, Joseph Allen, Matt Fragala  
Date: September 24, 2010  
RE: Air Samples Collected on September 19, 2010, Estabrook Elementary School

Results for the fourth and most recent round of air samples collected at Estabrook Elementary School on September 19, 2010 were received this afternoon and are summarized in this memorandum.

### **Overall Results**

As shown in Table 1 on the next page, the concentration of PCBs in indoor air was below 200 nanograms per cubic meter ( $\text{ng}/\text{m}^3$ ) in each room sampled on September 19, 2010. This result holds even for the two rooms (13 and 24) in which the unit ventilators were operating with the outdoor air damper in the minimum open position. The results of this round of testing demonstrate continued progress in controlling concentrations of PCBs in indoor air of the school. As shown in Figure 1 below, the average concentration of PCBs in indoor air of occupied spaces in the school has decreased from  $637 \text{ ng}/\text{m}^3$  on July 22, 2010, to  $147 \text{ ng}/\text{m}^3$  on September 19, 2010.

### **Effect of Encapsulating Interior Caulk**

Prior to collection of the most recent round of air samples, interior beads of PCB-containing caulk located below the ceiling plenum were encapsulated following a methodology accepted by the U.S. Environmental Protection Agency. Comparison of these results to concentrations measured in the third round of sampling provides information on changes in levels of PCBs in indoor air of the building after encapsulation of the interior caulk. For the 6 rooms sampled under the same ventilation conditions on both September 6, 2010 and September 19, 2010, concentrations of PCBs in indoor air decreased by an average of 53% (standard deviation 9%; range 39% - 65%).

**Table 1** Air Sample Results for Total Polychlorinated Biphenyls, Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, July 22, 2010 – September 19, 2010\*

Sample Location	Total PCBs (ng/m <sup>3</sup> )			
	Round 1 <sup>a</sup>	Round 2 <sup>b</sup>	Round 3 <sup>c</sup>	Round 4 <sup>d</sup>
Room 1	299	426	118 <sup>‡</sup>	63 <sup>‡</sup>
Room 2	–	775	455	189
Room 5	459	736	320	196
Room 6	1,800	764	483	171
Room 7A	–	–	5.19	–
Room 13	319	340	184	155 <sup>†</sup>
Room 21A	–	–	410	193
Room 24	680	601	226	173 <sup>†</sup>
Room 26	–	–	–	79
Room 31A	562	575	444	–
Room 39B	–	419	–	–
Room 39C	342	495	245	100
Library	–	469	196	–
Art Room	–	–	194	–
Teacher Work Room	–	–	138	–
Basement	–	–	227	–
Ceiling plenum (39C)	–	–	562	–
Outdoors	<3.79	<5.00	<4.20	<4.46

PCB polychlorinated biphenyl  
ng/m<sup>3</sup> nanograms per cubic meter  
– air sample not collected at that location

<sup>a</sup> Round 1 samples collected July 22, 2010, during summer conditions.

<sup>b</sup> Round 2 samples collected on August 25, 26 or 27, 2010, following removal of caulk around exterior window frame.

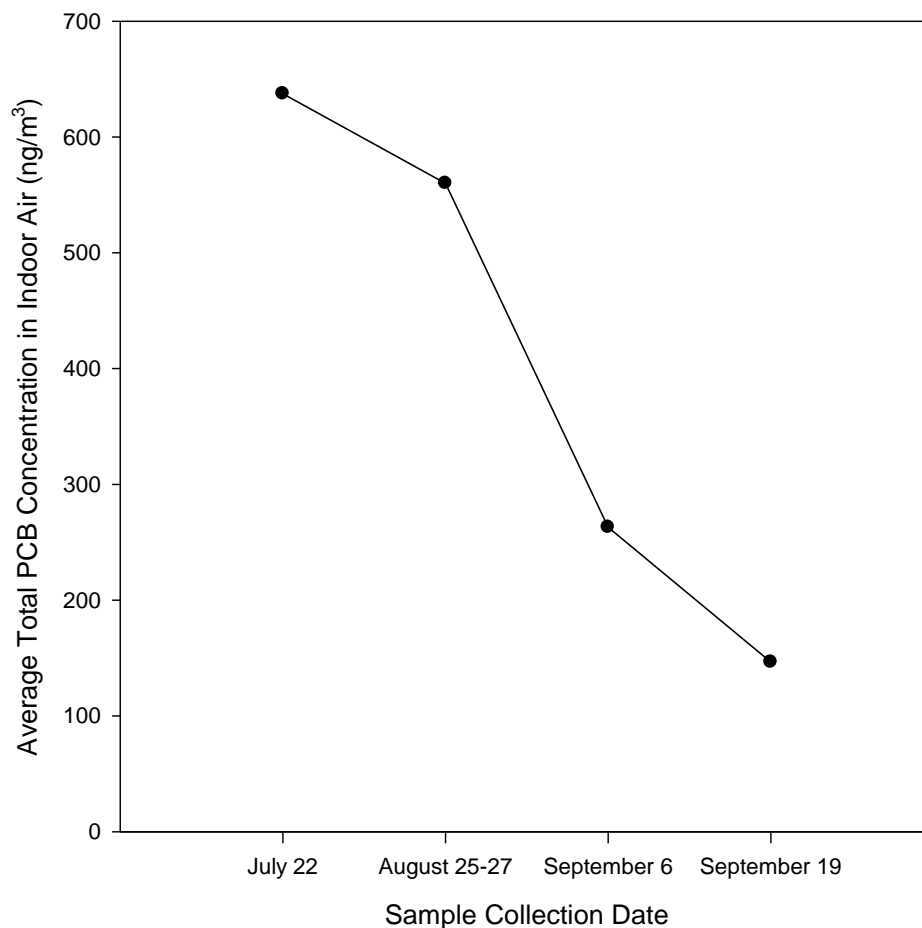
<sup>c</sup> Round 3 samples collected on September 6, 2010, following optimization of outdoor air delivery and central exhaust, unless otherwise noted.

<sup>d</sup> Round 4 samples collected on September 19, 2010 under same ventilation conditions as Round 3, unless noted otherwise, and following encapsulation of interior caulk located below the ceiling plenum.

<sup>†</sup> Samples collected under simulated winter conditions with minimum outdoor air delivery.

<sup>‡</sup> Sample collected with supplemental air outdoor air (1200 CFM).

\* PCB concentration analysis performed by Alpha Analytical Inc., using U.S. Environmental Protection Agency (EPA) Method 10A (GC/MS-SIM).



**Figure 1** Average Concentration of Polychlorinated Biphenyl (PCB) in Indoor Air of Occupied Spaces, Estabrook Elementary School, July 22 – September 19, 2010.

### Effect of Simulated Winter Conditions

To simulate the effect of winter conditions on PCB levels in indoor air, the unit ventilators in Room 13 and 24 were configured to provide their minimum flow rate of outdoor air. Under this setting, the concentration of PCBs measured in indoor air was 155 ng/m<sup>3</sup> in Room 13 and 174 ng/m<sup>3</sup> in Room 24. By applying the average effect of encapsulation (53%) reported above and considering results from the previous round of testing, the change in outdoor air delivery resulting from the simulation of winter conditions was estimated to increase concentrations of PCBs in indoor by 73% compared to when the unit ventilators were in cooling mode. As expected, preliminary analysis of the ventilation rates and PCB concentrations during the third and fourth round of testing suggests a consistent inverse relationship between outdoor air flow and PCB levels in indoor air.

## **Summary**

Concentrations of PCBs in indoor air of rooms in the school decreased by an average of 53% following encapsulation of interior caulk identified below the ceiling plenum to date. In addition, a predictable effect of reducing outdoor air ventilation on concentrations of PCBs in indoor air was observed. Overall, the average concentration of PCBs in indoor air of the school has decreased by more than four-fold as a result of interventions made since the initial round of air sampling.